The MAC Flyer

APRIL 1981

Know Your Enemy. . . page 16

The MAC Flyer

MILITARY AIRLIFT COMMAND

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For Greater Safety and Efficiency in MAC Air Operations.

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Flyer Call

You may have noticed that we devoted several pages in the March and April issues of the magazine to a study of distraction. There's a very good reason: Failure to pay attention to the position and trajectory of the aircraft at critical times is a major factor in aircrew-caused flight mishaps.

There are many types of distraction, but a serious aircraft system malfunction is probably the most potent, as most flyers who have experienced an inflight emergency will attest. However, such serious malfunctions alone aren't usually the cause of a transport aircraft crash. With a few dramatic exceptions—catastrophic structural failure, violent flight control malfunction, etc. — our transports are designed to survive even *multiple* major systems failures.

When a cargo plane crashes after a "survivable" systems problem, the most frequent cause in recent years has been the crew's failure to fly the airplane. This doesn't imply that they actually failed to hand-fly the aircraft in every case, but that at some critical point in the flight the pilots weren't aware of the plane's position and where it was going. After such fatal errors are made, a tragic accident often becomes inevitable. The first and most basic rule for surviving serious inflight emergencies is "Maintain aircraft control!"—live by it.

JPC

Even the Little Ones

Every storm cloud can pack a perilous punch for aviators who fly into them.

Many crewmembers may believe that there is a significant difference between the dangers posed by "little summer afternoon rainshowers" and the dark, heavy kinds of thunderstorms that have destroyed aircraft and human lives. There is, of course, quite a difference between the forces acting in rain-producing stratiform clouds and those in cumulus clouds which are growing rapidly and generating fast-moving up and down drafts. If the weather conditions are right for convective activity, however, then most any cloud with enough moisture in it to produce a healthy echo on aircraft weather radar can be hazardous—as this account of an airline encounter shows.

The crew of a Boeing-727 airliner was forced to use "extreme recovery procedures" to avoid a crash when their plane was buffeted by strong wind shear during an ILS approach to The William B. Hartsfield Atlanta International Airport, according to the National Transportation Safety Board. The Boeing trijet came within 375 feet of impacting the ground short of the runway when it passed through a localized but heavy rainshower and encountered violent changes in horizontal and vertical wind velocities.

Acting like a giant hand, a downburst of air from the storm pushed the jetliner with 77 people aboard from 1,000 to 375 feet AGL in a matter of seconds. Fortunately, a horizontal shear generated a strong headwind which increased the plane's climb capability and air speed at the last moment, aiding the crew in their attempt to recover. The captain also said that his simulator training in dealing with wind shear helped him react quickly and correctly when the 727 was hit by the storm's full force.

Although Atlanta's Hartsfield International is equipped with a low-level wind shear alert system, its capabilities are limited to detecting surface-level wind shears within the airport boundary. Because the airliner encountered severe conditions at about three and a half miles on final, the wind shear alert system offered the crew no warning of impending danger.

However, the NTSB also noted, "the major criterion upon which flight crews at Atlanta based their decision to land in the presence of known thunderstorm activity [that day] was the fact that their aircraft radar showed no countour-producing* storm cells along the runway approach course." Using this standard set the crews up for encountering dangerously strong winds. Even a storm cell of relatively mild intensity can cause very strong up and down drafts, especially when the cell is in its generation stage. Using the NTSB's words, "Any echo-producing storm cell located astride the landing approach course should be avoided regardless of whether or not it can be contoured by the aircraft's radar." As the Boeing-727 crew found out, even the little ones can get you.

(*"Contour-producing" refers to the way a storm looks on aircraft radar in the "contour" or "iso-echo" mode. Heaviest precipitation is usually seen as a dark area surrounded by a bright return to distinguish it from less intense precipitation. Radar cannot show wind velocities or turbulence.)

This year's Safety Award nominations revealed many sterling examples of individual and unit enterprise in achieving . . .

Safety Successes

by Maj James G. Gibson II
Supervising Editor

Looking over the packages for 1980's MAC Safety Award nominees, I discovered a veritable treasure trove of interesting and sometimes amazing activities and accomplishments by units and individuals. In the interests of cross-tell, I have sifted out some of the more creative and effective safety innovations to pass along for your edification. Also thrown in at no extra charge is a potpourri of noteworthy mission related activities—those that tended to stand out like mountain-tops above the usual ground fog of superlatives that so often typify award nominations of any sort.

Notable Mission Activities

Safe flying hour totals were impressive to say the least, and leading the pack for the year were the 375 AAW and the 60 MAW, with nearly 80,000 and over 60,000 hours respectively. That represents a lot of time boring holes in the clouds, as well as thousands of takeoffs and landings. Total 1980 flying time for the entire command was over 690,000 hours!

A sizeable chunk of MAC's airborne clock-punching was accomplished while units were participating in exercises. Over 40 different joint exercises were mentioned in the writeups submitted by the 16 units nominated for the MAC Flight Safety Achievement Award. The variety of worldwide locales and the diversity of scenarios are downright mind boggling, and they leave no doubt about the importance of "war games" in MAC's role as America's "backbone of deterrence." Three examples of what you might have found typical wings doing could include the 438 MAW at McGuire AFB participating in 20 separate exercises, the 463 TAW at Dyess AFB airlifting 45,000 people and 9,400 tons of equipment during exercises, and the 62 MAW at Norton AFB logging some 2,000 hours of exercise related flying time.

Pope AFB, N.C., might well be nicknamed the "Exercise Crossroads," since the 317 TAW there supported over 2,000 sorties which were flown into and out of the base in conjunction with various war games. The wing also played host for *Volant Rodeo*, the second annual tactical airdrop competition. Despite the challenging conditions and the feverish pace of activities, the week was accident free. And, when the dust had settled and the scores were totaled, the 317th emerged with first place honors! The Pope C-130 haulers also supported a scientific expedition to the Arctic Icecap, and being the only CONUS-based unit with AWADS (Adverse Weather Aerial Delivery System) capabilities, it played "Seeing-Eye Herk" for airdrop formations executed in IMC weather. Incidently, while the 317th was taking care of the North Pole area of the globe, the 60 MAW from Travis AFB marked its seventh year in support of *Operation Deep Freeze* by carrying 1,154 passengers and 407 tons of supplies and equipment during its 17 Antarctic resupply missions.

In one of the more spectacular aerial feats of the year, a 63 MAW crew took a C-141B, departed from Pope AFB, flew to Hanover, West Germany, where they performed an airdrop of heavy equipment, and then recovered back at Charleston AFB, South Carolina—20.5 hours later. They were able to complete their grueling, nonstop round-robin demonstration of America's impressive ability to project its power over a great distance by making two aerial refueling hookups enroute. And, to keep things interesting, the weather was rotten most of the time!

In another demonstration of America's "Can-Do," C-5s from the 436 MAW at Dover AFB, Delaware, participating in operation *Bright Star* at Cairo West, Egypt, helped show the world that the nation's new Rapid Deployment Force could mobilize and move out as advertised in support of a besieged ally in a faraway place.

Crews from the 39 ARRW performed 385 rescue missions and were credited with saving 300 lives—nearly half the entire Rescue Service total—in the process. For specific examples of performance under pressure it was hard to top the saves made by the 71 ARRS when crewmembers from that squadron pulled 74 people from the burning cruise ship *Prinsendam*, which was located far out in the icy Gulf of Alaska; or the 263 saves and 79 assists credited to the 33 ARRS during the rescue of imperiled South Korean flood victims.

Some of MAC's airlift units even got in on the rescue act. The 616 TAG at Elmendorf AFB, Alaska, assisted with the *Prinsendam* heroics; the 62 MAW provided an airborne communications center for coordination efforts in the wake of Mt St Helen's stupendous, destructive eruption; 63 MAW aircrews dropped rafts and survival gear to a downed pilot and shipwreck victims on different occasions; and the 437 MAW at Charleston flew humanitarian airlift missions which carried lifesaving equipment and supplies to earthquake victims in Algeria and the Azores.

We can't afford to leave out the courageous crews of the 41 RWRW who gathered first-hand weather information the hard way all year by flying into the hearts of 33 tropical storms and back out again -- safely.

And finally, to keep new grist for the crewmember mill flowing into the MAC pipelines, the 443 MAW at Altus AFB graduated 2,600 students from its C-5 and C-141 aircrew training courses. Little Rock's Tactical Airlift Training School, meanwhile, prepared a like number of crewmembers to deal with the challenges of flying the Hercules.

Unit Safety Initiatives

What would you do if you had a special week all lined up to scare pesky birds away from your airfield environs and no winged warblers showed up? Well, that was the dilemma faced by the 89th MAW safety folks at Andrews AFB, because their efforts to eliminate conditions attractive to feathered homesteaders had been so effective. Working with the civil engineers they had made sure that grass and weeds were maintained at the correct antibird height, ditches were drained, and other attractive habitats around the runways were removed. So when many birds took the hint and sought refuge elsewhere, they left the 89th no choice but to cancel their bird-scare week due to a lack of avian adversary participants!

What would you do if you had a special week all lined up to scare birds away from your airfield and none showed up?

Fly-ins and meetings with civilian aviators seem like outstanding ways to promote flight safety and good will between military and non-military flyers, and several units had active liaison programs with pilots in nearby communities. There was the Civil Aviation Awareness and Midair Collision Avoidance Program of the 62 MAW, which featured visits to airports in the McChord area and a general aviation fly-in at the base. Altogether, over 2,000 pilots in the general aviation community participated during the year in the crossflow of information which helped to identify and eliminate problems and hazards. Similarly, the 438 MAW held a fly-in at McGuire, and the 317 TAW sponsored a fly-in and Aviation Safety Seminar which brought 200 civilian pilots to Pope AFB for an exchange of perspectives. In addition, the Pope wing conducted an interfly program between MAC C-130 pilots and Army chopper drivers, besides maintaining an active speaking and briefing schedule for civilian groups and FAA seminars.

A "Task-5A Working Group" consisting of safety officers from local installations, airport managers and civilian, military and FAA representatives was sponsored by the 63 MAW to promote flying safety in the crowded airspace of Southern California.

Attacking a specific hazard, the 314 TAW established special communications channels with the U.S. Forestry Service to eliminate the potential for midair collisions between C-130s on low-level training missions and forestry planes battling widespread tree and brush fires which cropped up almost daily during an unusually long, hot, dry summer in Arkansas.

Joining with its host base safety team, the 463 TAW at Dyess co-sponsored a fly-in which was held in conjunction with the base's annual open house. The wing is also active in the Abilene Area Aviation Safety Council.

Several wings were busy producing written safety material for both in-house and public consumption. For the edification

of civilian pilots in the Andrews AFB area, the 89th safety troops put together a "Midair Collision Booklet." A "Flying Safety Highlights" pamphlet and "T-tail Topics," a one-page flyer highlighting special aircrew interest items, were distributed regularly to 436 MAW flying squadrons by that wing's safety team.

Individual Safety Initiatives

Continuing the same thought, several individual safety people received specific praise for their literary efforts on behalf of "the cause." Captain Robert C. Hill wrote a lightning strike pamphlet to help remind 62 MAW crews to avoid that shocking natural phenomenon. He was also responsible for coordinating McChord's fly-in which attracted 300 local civilian pilots, and he used a grassroots approach to reach those who didn't come to the base by visiting and holding meetings at several different local airfields where he briefed over 500 civilian pilots during the year.

Major Alan C. Murphy (what a last name for a safety officer, eh?) of the 39 ARRW drew up a mishap investigation guide which is to be included in the forthcoming revision of MACP 127-4. He also submitted a well thought-out and thoroughly staffed package suggesting a new MAC award for "Excellence in Airmanship." The idea was adopted and is now part of the command's safety awards program. By the end of the year, nearly 70 handsome plaques attesting to feats of aerial excellence had already been awarded to worthy MAC crewmembers. In his "idle moments" Major Murphy authored several safety related articles for professional journals. Another creative safety type, SSgt Richard L. Edde, originated numerous ideas for posters, wrote newspaper articles, and did a host of things to see that safety topics received their just share of publicity in the 60 MAW, Travis AFB.

Believing that a carrot elicits a more productive reaction than a kick, both Major Murphy and Major Richard D. Shapiro of the 67 ARRS instituted programs—with their commanders' blessings, of course—in their respective units to reward people by granting a special day off whenever specified accident-free periods of time had elapsed.

Captain Gary A. Dix, whose Detachment 5, 40 ARRS, had zero accidents or operational injuries, developed a C.R. Terror-type character that he employed to promote safety in dramatic and interesting ways. He also designed and built a special "greenhouse window" cover to protect the vulnerable and fragile upper windows on his unit's helicopters.

A carrot elicits a more productive reaction than a kick.

Taking a cue from cartoonist and humorist Bob Stevens in *Air Force Magazine*, Captain David A. Levine gave his fellow flyers in the 55 ARRS a chance to "tell it like it is" for the benefit of all. His "There I Was" program provided a vehicle for anonymously sharing unusual flying experiences. (Note: *The MAC Flyer* has a similar idea called "Flyers Anonymous," and we always welcome candid contributions and war stories from any of you out there in the trenches.)

Helping to enhance and streamline MAC's safety awards program at the working level, Captain Robert D. Vanderhoeven developed a computer retrieval system which identifies people in the 63 MAW who are eligible for Individual Flying Hour Milestone Awards early in the game. That way, paperwork can be staffed far enough ahead for a timely presentation.

Final Thoughts

Each and every one of the units and individuals we've mentioned—and please keep in mind that this was only a sampling of safety award nominees—had laudable achievements, but we can't wrap this up without mentioning the obvious pride uniquely expressed in the nomination of Second Lieutenant Jerald R. Borger for MAC Additional Duty Safety Officer of the Year. His commander pointed out that his unit, HQ AFGWC (MAC), had sustained only one operational mishap during the year—a broken toenail! The lieutenant must have had a good year for sure if a dented pedal digit was all that stood between him and a perfect safety record.

Seriously, though, all year long as we read about the mostly sad results of things people do unsafely, and thereby bring grief down upon themselves and others, it is easy to become pessimistic and negative. Going over the 1980 Safety Award nomination packages put things back in perspective for us at *TMF*, and we hope it will for you, too, by reminding you that a lot of people are doing a lot of things *right*, and helping to keep the MAC machinery and mission moving dependably, effectively and safely.

Slip Slidin' Away

One generalization about the weather and flying which works pretty well is the assumption that an airfield that's been recently clobbered by a thunderstorm will have a wet runway. If you're going to operate your aircraft on that wet runway, then the potential for some type of hydroplaning is there. The severity and duration of hydroplaning depends on many variables, including the aircraft's ground speed, the tire pressure and tread depth, the depth of water or slush on the runway, and the characteristics of the runway surface itself. However, the type or weight of the aircraft has less to do with whether or not it will hydroplane. Understanding the three basic types of hydroplaning can help you meet their challenges and keep your particular air machine safely under control.

Dynamic hydroplaning is the most common type. In this case, the tires are "surfing" on a film of water that separates them from the runway surface. This usually occurs at high speeds after touchdown or just before liftoff. When riding on that layer of water, a stopped tire won't spin up, and one that is spinning will actually slow to a stop, because the coefficient of friction is zero. As the plane slows below total dynamic hydroplaning speed, partial dynamic hydroplaning is still possible, and viscous and reverted rubber hydroplaning become more likely.

When smooth runway surfaces are moisture covered, tires can only partly displace the water trapped between the tread and the runway, so the coefficient of friction is reduced. This is viscous hydroplaning and it can easily happen when the runway surface is coated with paint or rubber. Once viscous hydroplaning starts the tires into a skid, then the third type of hydroplaning can happen even at low speeds.

Reverted rubber hydroplaning begins when skidding tires heat up enough to cause the rubber to change back into its uncured state. This elastic substance can seal the tread grooves, ruining the tire's "grip." It also can form into little balls or rolls that act like ball bearings between the tire and the runway. This type of hydroplaning not only reduces the coefficient of friction to near zero but can cause tire failure.

To show you how these last two can team up to cause you grief, let's look at a mishap reported by the Flight Safety Foundation. "The runway is in sight five miles ahead and there's light rain, although heavier showers can be seen beyond the departure end. You're careful; the landing is normal and the aircraft rolls straight and true. Braking is normal and works well. You slow to taxi speed and it's time to turn off. Whoops! Suddenly the aircraft has the bit in its teeth. It turns 180° in a clockwise skid and you end up ignominiously perched with one wheel off the taxiway and down in the omni-present ditch."

How could that happen? Very easily: like most well used runways the departure end was covered with rubber deposits that smoothed out the runway surface. And quite a bit of the surface that wasn't covered with rubber had runway marking paint on it. The film of water from the rain made that end of the runway slippery, allowing viscous and reverted rubber hydroplaning to occur and the airplane to skid even at very low speed.

There are several ways to avoid the adverse effects of hydroplaning, and most aircraft flight manuals have instructions for landing on wet and slippery runways. In general, anytime rainfall is reported at an airport hydroplaning is possible, and the heavier the rain, the greater the hazard. Also, making sure the aircraft tires are in good condition is very important when operating on wet runways. Using the CT-39 as an example, its Dash One says that tires with good tread won't hydroplane in 0.2 to 0.3 inches of water, while a smooth tire can hyrdoplane in as little as 0.1 inch of moisture. Being aware of potential hydroplaning conditions, following your aircraft's operating procedures and having good tires can help keep you from slipping and sliding off a wet runway.

1980 Mishap Statistics

For MAC it was a very good year.

Military Airlift Command aircrew and support personnel set an all-time aircraft accident prevention record in 1980 when the Air Force's "backbone of deterrence" suffered only four DOD Class A flight mishaps while flying over 690,000 hours. This is the smallest *number* of major mishaps recorded for MAC in its 32-year history. MAC's 1980 Class-A rate of 0.576 per 100,000 flying hours is the second lowest in the command's history, with the 1968 rate of 0.45 being the only better *rate* on record.*

Around the world and in every kind of weather, MAC's fixed and rotary-wing aircrew members met the challenges of demanding missions and proved their devotion to professional, accident-free flying. Operations factors accounted for about 50 percent of the 1980 Class A mishaps, a significant decrease from 1978 and 1979. Also, "operations" was a significant factor in only one of the five Class B mishaps.

Unfortunately, some less happy statistics also crept into MAC's 1980 flight safety record. While the four Class A mishaps destroyed only three aircraft, the lives of 12 aircrew members and 19 passengers were tragically ended. These grievous losses represent not only unnecessary human suffering, but an irreplaceable loss of national defense assets.

Back on the brighter side, MAC again undercut the annual mishap predictions from the Air Force Inspection and Safety Center (AFISC) at Norton AFB, California. They estimated that we would end 1980 with nine Class A and eleven Class B flight mishaps, and six destroyed aircraft. The hard-working professionals of the MAC family beat their predictions by 50 percent or better across the board.

Comparing MAC to other "large" MAJCOMs (Figure 1), you will notice that our Class A mishap rate is about half that of the next closest command—SAC, with a rate of 1.2. However, the most realistic comparisons are drawn by weighing our 1980 record against our previous performance, and accounting for the effects of changing mishap accounting criteria and missions. Figure 2 shows MAC's five-year mishap history as compared to the USAF rate. We have steadily driven the rate downward since 1978, and our 1980 performance is 25 percent better than we did in 1979. MAC's 1980 Class A and combined flight mishap rates are the lowest on record since we started using the DOD dollar-cost mishap classification system in 1977. Also, this year's Class A rate, and the number of major mishaps, are the lowest since tactical airlifters joined MAC over five years ago, dramatically increasing the command's size and altering its mission.

(*Preliminary research showed that the 1972 mishap rate was 0.53. After checking with AFISC, the *Flyer* staff learned that one of the 1972 "minor" accidents had been upgraded to a "major" accident. The actual 1972 major mishap rate is about 0.7. Therefore, the 1980 rate of 0.576 is, in fact, the lowest in 12 years.)

DOD Class A Mishaps

C-130E. The Hercules crew was flying a logistics mission with several scheduled stops. After making their first two deliveries successfully, they departed for their third destination. On arrival, they found the weather did not permit the required VFR approach, so they diverted back to their staging base. The weather there was about 10,000 feet ovecast with a broken cloud deck below that, rain showers, and the tower was reporting visibility less than three miles.

During an enroute descent, the C-130 was cleared to 3,000 feet by the local approach control. Passing 5,000 feet, the

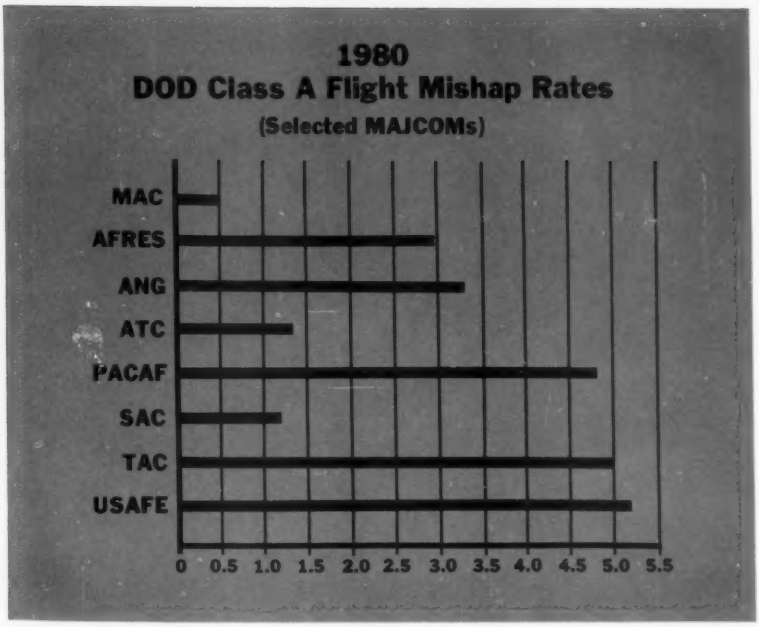


Figure 1

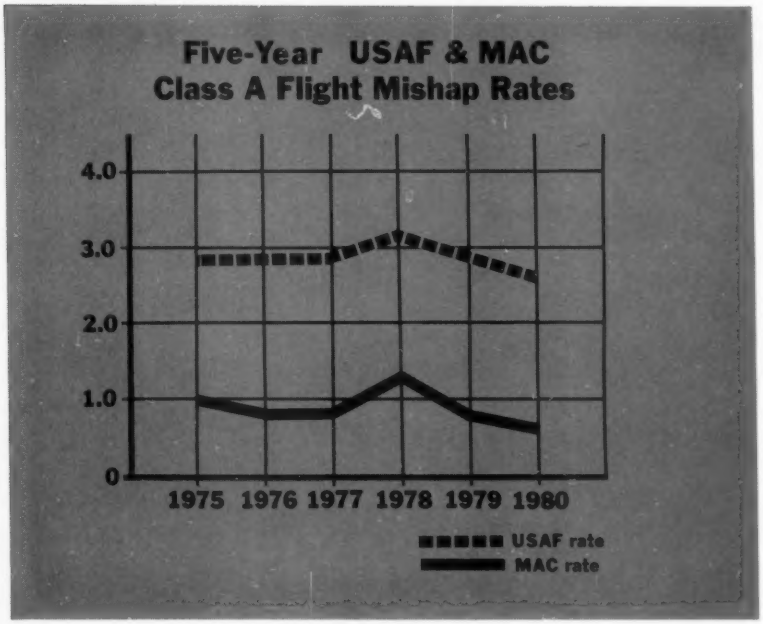


Figure 2

aircraft's radar target disappeared from the controller's scope. The aircraft crashed about 15 miles west of the airfield.

UH-1N. An IP and his student were practicing landings at an auxiliary strip. After one approach, the helicopter impacted the ground hard and in a left sideslip. The Huey rolled and came to rest on its left side. The crew egressed safely, but the chopper was destroyed by a post-crash fire.

C-5. Just as the gear-retraction sequence was started on takeoff, the Galaxy crew heard two loud bangs while the aircraft was passing about 100 feet AGL. The number-two engine fire light came on and the TIT went off scale high. The pilot immediately advanced the throttles on the good engines to TRT power and the left inboard was shut down using the fire handle. As they set up for an immediate return to the airfield, the fire indications persisted. Both fire bottles were used and nitrogen was discharged into the number two pylon. The pilot completed the heavy-weight, engine-out landing and stopped the aircraft on the runway where the fire department put out the fire. The crew and all 73 passengers egressed safely.

C-141A. The Starlifter was operating as part of an exercise on a night mission into a foreign airfield. Weather was 20,000 feet broken with visibility over five miles. The terrain surrounding the airfield was nearly devoid of ground lights, and it was a moonless night.

ATC cleared the C-141 for an enroute descent and visual approach. The crew set the Starlifter up for a visual pattern and

started a turn to downwind at about 2,000 feet. Approximately 30 seconds into the turn, the aircraft's airspeed, bank angle and rate of descent increased, and it crashed seconds later.

DOD Class B Mishaps

Three of MAC's 1980 Class B mishaps involved bird strikes to C-5s that damaged the engines. In all cases the Galaxys were operating at low altitude—two on takeoff and one on approach. Two of the strikes happened on local training missions with one C-5 sustaining 14 separate bird impacts affecting three of the four engines. Total cost for these three mishaps was over $268,000.

A material failure in the main-landing-gear system of a C-130 prevented the crew from lowering the left mains by either normal or emergency means. After extensive troubleshooting and getting expert advice through a Conference Skyhook, the crew decided that the left gear would not come down. They landed the Herk with the left main partly down, the right main retracted and the nose gear down.

After a hydraulics system malfunction, the C-9 crew used free-fall gear extension to get the wheels safely locked down. This procedure leaves the main gear doors hanging down lower than the wheels themselves and the doors are equipped with skids to prevent extensive damage. Due to communications problems, the crew was given incomplete information about the barriers on the runway. When the gear doors caught a cable on landing roll, the doors and fuselage area around the wheel wells were badly damaged.

Air Reserve Forces

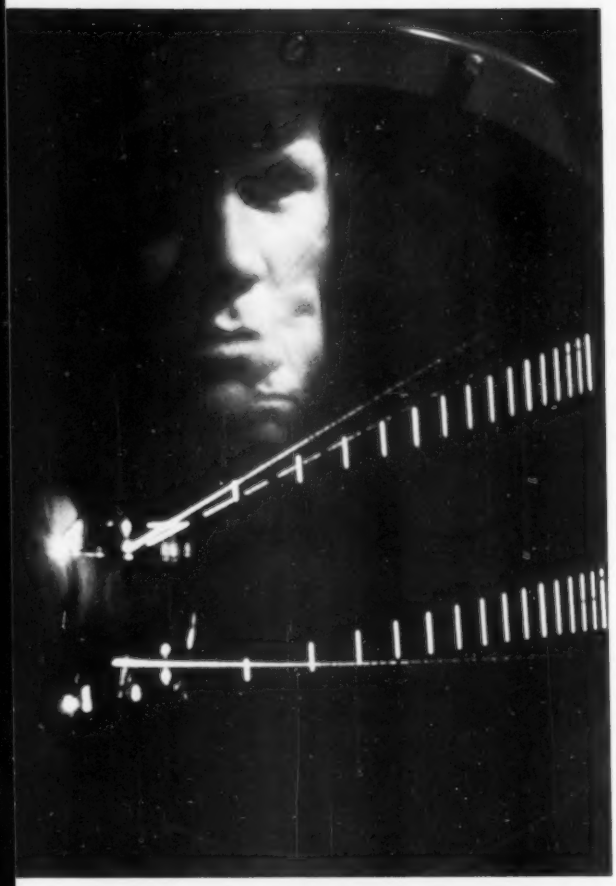
Two MAC-gained ARF units suffered DOD Class A mishaps during 1980. Although not charged against MAC's record, these mishaps serve to teach important lessons to our "full-time flyers."

A C-130 crashed during low-altitude, high-performance maneuvering on a local training mission. Pieces of the wing leading edge were found about 870 yards from the main wreckage location.

A C-123K was flying a spray mission in support of an exercise. During the spray pattern, the aircraft crashed.

Everyone in '81

Our 1980 flight mishap prevention record is excellent, and presents an exceptional challenge for 1981—to better our 1968 record. It is possible to push MAC's flight mishap rate even closer to the ideal "zero accidents" and still fly the demanding missions we are called on to perform daily. However, we can only do it if *everybody* in the command becomes personally involved with safety—not just paying lip service to it, but making it part of our lives and always doing our jobs in the safest way we know how. By preventing accidents we will be saving precious human lives and conserving national defense resources that the United States needs now and tomorrow.



Which course would you take?

PAR vs ILS

by Capt Charles M. Westenhoff
22 TASS, Wheeler AFB, Hawaii

Comparing PAR and ILS is like comparing apples and orangutans. You rarely have doubts or concerns about social interactions with apples, but orangutans require a bit of caution and cross-check—they demand more of your attention. That doesn't mean that one is necessarily better than the other—they're just different.

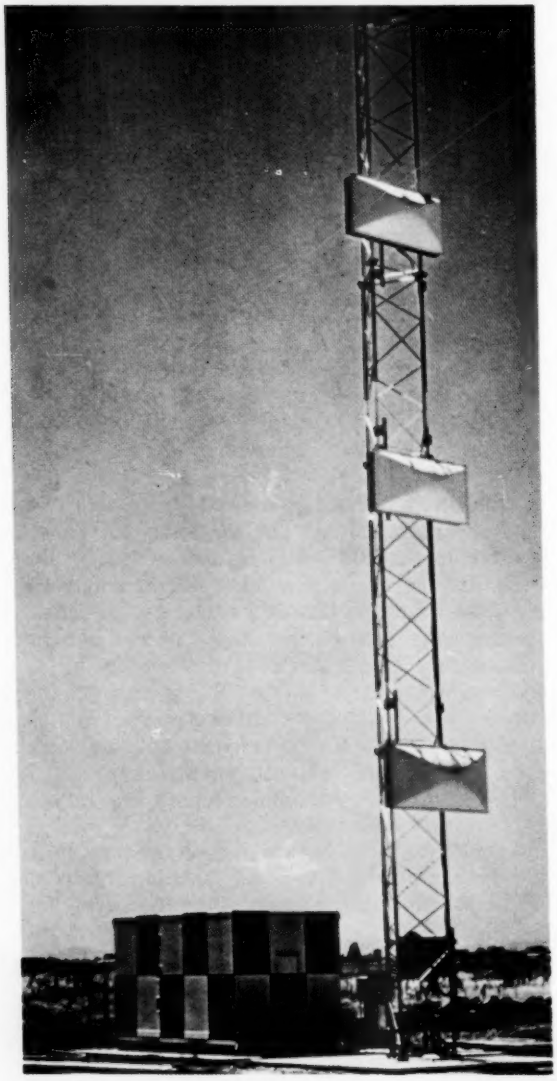
Many pilots favor the ILS for reasons that vary as widely as their personalities and flying techniques: "The ILS is self contained, less of a hassle, doesn't involve ground controllers, requires less attention to fly." But it may, in fact, be more demanding to fly the ILS *safely* because the ILS is only an electronic signal and requires constant cross-check of ident, position, rate of descent, etc. A lot of your attention goes into insuring that the ground station is working okay, your receivers and instruments are "on the beam", and you are where you should be.

With PAR, the *controller* provides the human attention to approach-guidance system safety. In fact, no approach aid has as much human attention as the PAR. The controller verifies the alignment of the scope at frequent intervals, monitors its performance at all times, and has a constant, real-time picture of your aircraft and the ground structures that appear on the scope to tell when things aren't kosher. PAR also provides the strong motivation factor of having another human give you instructions, then monitor how precisely you carry them out—you can get too low on an ILS guide slope and play at lumberjacking, but a sharp PAR controller won't let you. Of course, PAR is susceptible to human error in both the controller and the pilot, along with all the possible pitfalls of miss-communication between the two. On the positive side, though, you could view this extra human element as a redundancy factor similar to having additional cockpit crewmembers monitoring an approach.

If you think the ILS is less distracting " 'cause you like your peace and quiet," fine, but compare the information available. Both systems give you course and glide path guidance, but the ILS

transmitter itself can't provide traffic or bird advisories on final. Nor, can it tell you to expect snow showers or a wind shear between five and two miles from touchdown.

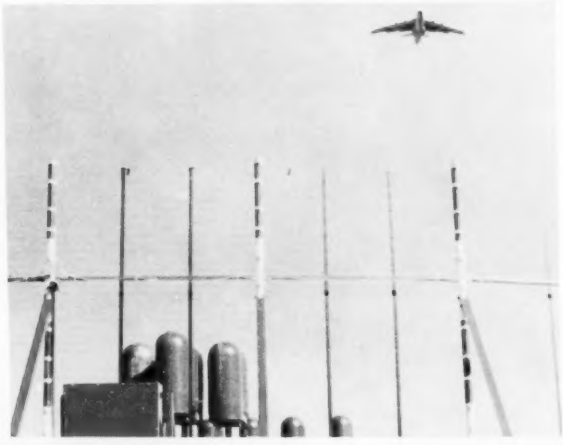
But before incurring the wrath of Mr. Willcox, Mr. Collins, Tex Instruments, et al., let me hasten to add that the ILS is a very refined, sophisticated system, carefully flight checked, with lots of monitors built in to shut the machinery down if something is even a wee bit wrong. And it's much cheaper to operate than a PAR. However, if your aircraft receivers foul up, only you can detect that.



ILS glide slope antenna.

With PAR, if the radar fails, you're sent around ("Radar contact lost, if runway or approach lights not in sight. . . .") and if the radio fails, you follow lost-comm procedures. Pretty straight forward, eh?

But wait a second. Why compare ILS and PAR at all? If only one is available, and the weather is lousy, you'll use *that* precision approach aid. If both are available, and the two approaches coincide, you can get a monitored ILS, or back up your PAR with an ILS display on the flight instruments. A word of caution here—if you're flying a PAR and have the ILS to back it up, fly the controller's headings or you both will probably become confused. Also, remember that if the radar goes out or you stray outside the PAR safe-approach airspace, the final controller has little choice but to either initiate missed approach instructions or clear you for a visual approach if the weather is good enough and you have the runway in sight. In such a case it would be the crew's responsibility to immediately advise the controller of their desire to transition to the ILS. Of course, as always, it's also the aircrew's responsibility to make sure they can do it safely. If you don't want to take directions from the ground, ask for a PAR monitored ILS. In this case, the PAR controller can take over with a radar approach if the ILS dies or you get lost somewhere out on final. Either way, remember that *both* systems, when they are available together, give you the cumulative safety advantage of two sources of flight parameter information from differing viewpoints during one of the two most hazardous phases of flight. So go ahead, give that orangutan an apple and press on.



Solid-state ILS antenna.

Distraction

Second in a two-part series.

The first installment of this article, which appeared in TMF *last month, focused on operational sources of distraction events voluntarily reported by aircrews through NASA's Aviation Safety Reporting System (ASRS). Operational causes included running checklists, troubleshooting minor malfunctions, watching for other aircraft, ATC communications, monitoring radar, looking for the airport, fatigue, and increases in cockpit workload due to having a new and inexperienced first officer (copilot) on the crew.*

This month we conclude by reporting sources of distraction stemming from nonoperational sources. These are the incidental crew activities common to most flights. They aren't essential or even required, yet they have the potential to divert our attention from our most fundamental responsibility—flying the airplane.—Ed

Nonoperational Distractions

In addition to flying safely from "A" to "B", airline cockpit crews are expected to assume certain nonoperational responsibilities for the general well-being of their passengers and do some "bookkeeping" for their employers such as filling out crew logs, maintenance forms, departure and arrival messages, and making computer-form entries. Many of these minor tasks trigger company communication messages to departure or arrival stations.

These tasks have long been recognized by airline management as potential distractions from more essential crew duties and published policies attempt to eliminate such interruptions. A total of 55 ASRS reports dealt with cockpit distraction caused by disruptive activities not directly related to the operation of the aircraft.

Company Radio Distractions

Analysis of the 16 cockpit distractions caused by company communication tasks shows that all except one (no landing clearance) resulted in altitude deviations from ATC assignments. However, only five of these were due to misunderstood ATC communications; nine were caused by flight errors in which the flying pilot "inadvertently" departed his altitude without being challenged by the nonflying pilot who was momentarily engaged in company transmissions. It is noteworthy that in six of the nine events, the nonflying pilot belatedly recognized the altitude deviation prior to ATC radar intervention. In five of these, the right-seater was flying the plane. In two of these cases, the error was rectified by a crew request for altitude confirmation from ATC. In the four incidents of flight error in which the captain could be identified as the flying pilot, there were no challenges by the first officer. In one narrative the flight engineer was communicating with the company, the captain was busy on the PA system, and the copilot misunderstood an ATC assigned altitude while descending the aircraft. Four of the eight distractions occurred above 10,000 feet, outside terminal areas.

Flight Attendant Distractions

Most of the inflight service distractions came in the descent phase and involved flight attendant discussions with the captain about travel connections, cabin situation, and general passenger problems. Various errors resulted from this withdrawal of attention: misreading an altimeter by 10,000 feet, late descent, overshooting and undershooting altitude crossing restrictions, etc. Many of these procedural mistakes, however, seemed to involve intracrew communication failures. An amended clearance or new altitude assignment was "rogered" to ATC by one pilot but the information was not passed on (nor was understanding confirmed) by the other pilot.

Paperwork Distractions

In all "paperwork" distractions, the captain was the individual distracted from monitoring the flight path being flown by the first officer. All incidents

resulted in altitude deviations from clearances and all were intercepted by ATC radar challenges. Filling out logbooks, engine readings, on and off times, and perusing a sigmet chart were identified as the administrative tasks that caused significant distractions.

All incidents occurred either in climb or descent. It would appear that adherence to a rule of "no paperwork in climb or descent" would have prevented all of these distraction incidents.

Conversation Distractions

All cockpit conversations noted by the airmen were relevant, that is, they dealt with operational matters: fuel load, time to descent, engine malfunctions, etc. Weather was never noted as a factor. There were indications in several narratives that line-type instruction was being offered by the captain. Two incidents centered on distraction due to check-airmen discussions. It is interesting to note that when talking to each other, neither pilot was monitoring the aircraft path. Seven of the nine conversation distractions resulted in an "altitude bust"—failing to level off at an assigned altitude.

PA System Distractions

The usual effect of public address (PA) system distractions was removal of the captain from the ATC communication loop. When the first officer misunderstood or misstated a clearance altitude assignment it went unchallenged, resulting in an "altitude bust" usually discovered through ATC radar monitoring. In some cases intracockpit miscommunications were made by the nonflying pilot setting the wrong altitude into the altitude select window.

In the instances of misinterpreted altitude clearance messages, there is rare mention of any clearance readback confirming the altitude change with ATC. Several reports detailed prolonged cockpit discussion as to the correctness of the clearance. Usually, an assumption was accepted that

the questioner "must have missed" a transmission while using the PA system.

Conclusion

This human factors study of air carrier pilot distractions emerged from the relative frequency of the one phrase "we were distracted by . . . " in numerous airmen reports to the ASRS system. In many cases the sentence was completed by the mention of a routine and ordinary cockpit task.

Implicit in the narrative was the recognition that "distraction" meant attention was diverted from management of the aircraft, especially the maintenance and control of a desired flight-path. There seemed to be general puzzlement as to why, on a particular flight, at a particular time, accomplishment of usual cockpit tasks suddenly and unexpectedly ended in near-disaster.

Though distraction, as a human factor, cannot be eliminated from the cockpit, the identification and type-classification of distracting incidents suggest possible improved means and techniques for minimizing causes of distraction and also for assisting in maintenance of basic concepts in cockpit management and crew coordination. This is important because distraction is not merely a cause of individual error. More critically, it impairs crew concept fundamentals which have been "human engineered" to protect against the errors that crewmembers will inevitably commit.

Distraction is as likely to happen during ground operation as in flight. Schedule pressure combined with taxi checklist, wingtip clearances and ATC radio transmissions can result in unauthorized and potentially dangerous crossings and entries onto active runways.

Causes for nonoperational distractions may be minimized through continued emphasis on cockpit priorities during climb and descent. Although PA announcements, logbook entries, and company radio messages may fit into the overall cockpit workload, the crew backup on confirming correct ATC clearances and

altitude adherence may be temporarily lost.

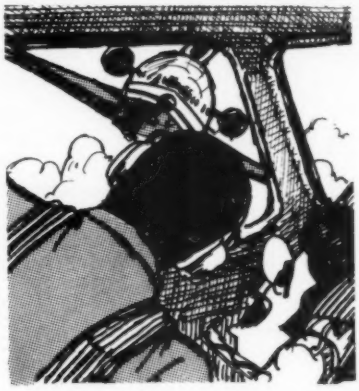
"Altitude busts" due to misreading profile descent charts may be reduced by format changes such as boldly highlighting DME distances associated with crossing altitude restrictions. Including several different runway procedures on a single page also has led to altitude excursions during profile "read-as-you-fly" descents.

Effects of distraction might be diminished if pilots were cautioned not to "guess" which ATC clearance altitude they will receive. Pretakeoff selection of an ATC altitude that results in missetting the correct altitude reminder is linked to distraction in typical overshoots. The added trap in this error is that a lower altitude restriction is usually due to traffic at the normally expected level.

Although convention dictates that "one pilot flies the airplane," the distinction may become obscured when the aircraft is under control of the autopilot. Both pilots tend to become vulnerable to any distraction. Auto-capture of level-off altitude must therefore be monitored closely.

During a distraction event, individual pilot misunderstanding or misinterpretation of an ATC clearance led to numerous altitude deviations. Emphasis should be made on two crewmembers monitoring and cross-checking ATC clearance messages. Conversely, ATC controllers should remember the importance of listening for correctness in clearance readbacks.

The ASRS system records an average of two air carrier potential conflicts every day within U.S. airspace. Traffic watch is a "must" requirement that should be accomplished without detracting from crew management of the aircraft's desired path. There is a real and understandable temptation for all eyes to rivet attention to the outside world when flight conditions are CAVU and "traffic at twelve o'clock" has been called. Emphasis is needed in using the crew concept to monitor flight



path while responding to traffic advisories.

Air carrier flight standards may deem it advisable to insure that crew coordination principles are applied in such "real-life," on-line distractions as weather avoidance, radar monitoring, and minor system abnormalities during the climb and descent phases of flight.

Numerous airmen reports registered chagrin and unease at a radar controller's failure to target all converging small aircraft traffic. Limitations of a fully automated RDP mode radarscope are not well known. Further, flight crews seem to be unaware that ground radar does not "paint" the same cloud buildups and thunderstorm cells that they are trying to avoid.

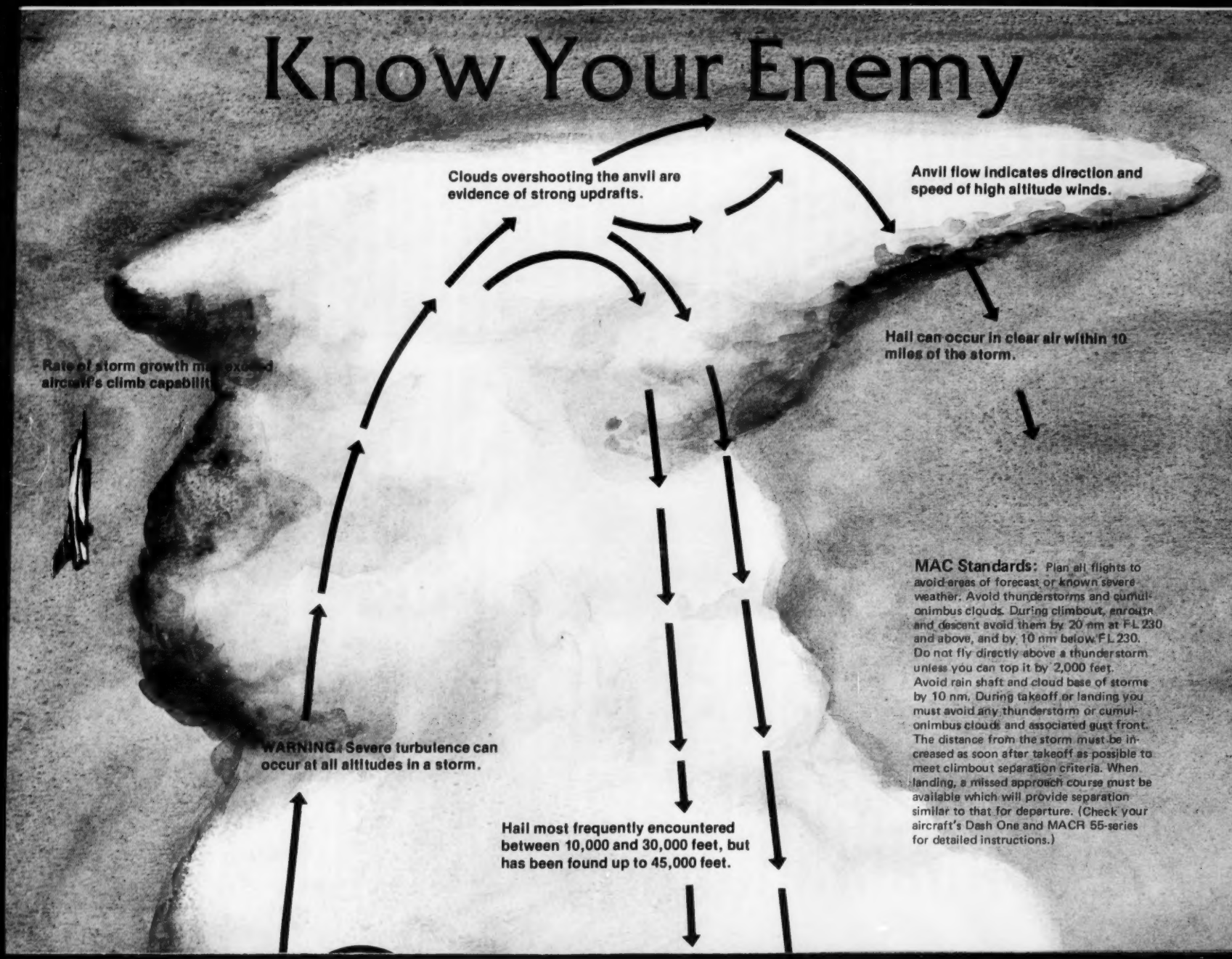
Finally, distraction is most critical at:

- Ground level to 3,000 feet AGL
- 10,000 to 11,000 feet MSL
- The plus-500-foot altitudes occupied by VFR traffic skirting the edges of TCA airspace.

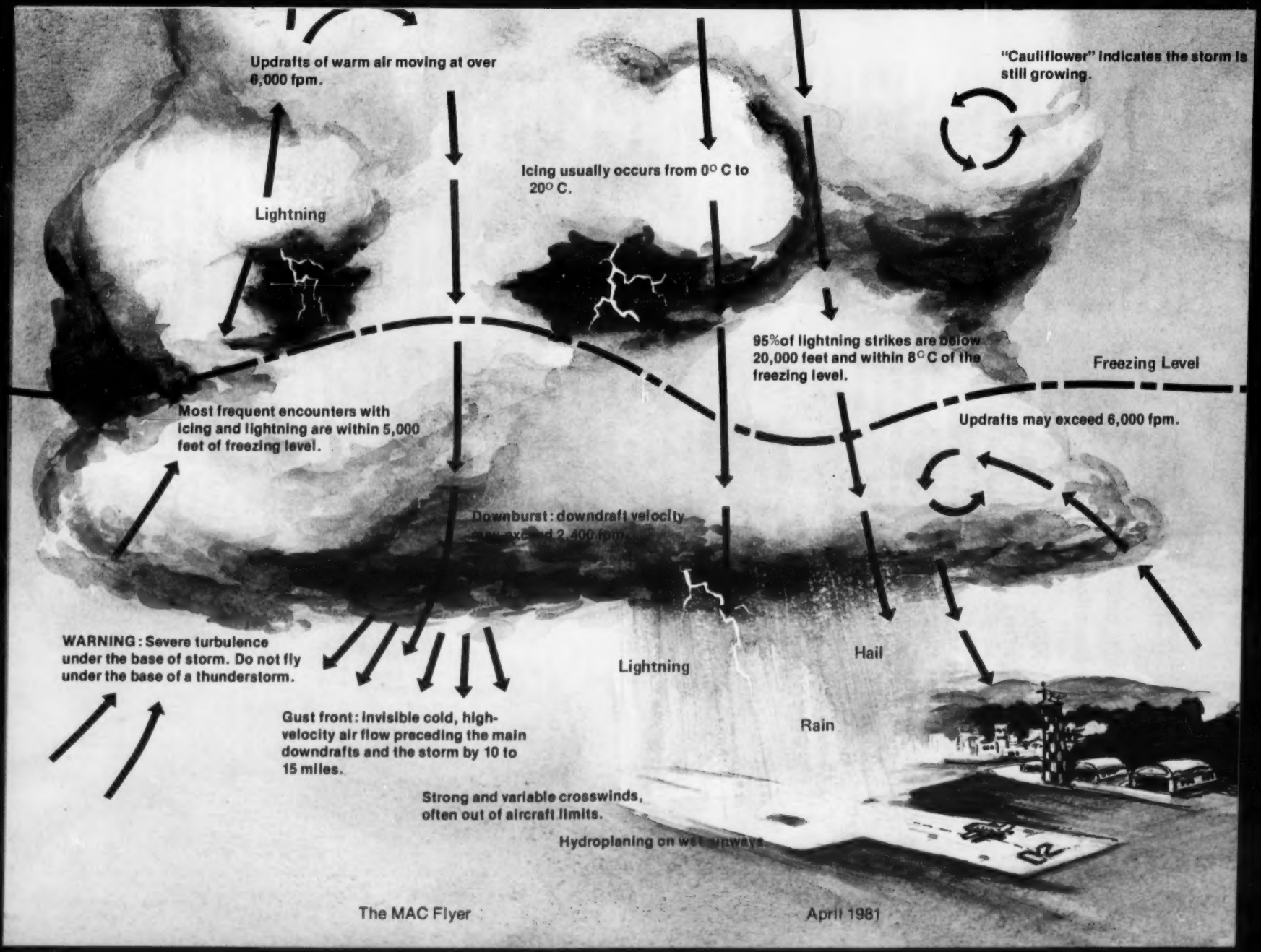
Distractions at these altitudes, according to ASRS reports, are more likely to put flights in immediate peril of conflicting with other traffic (both on the ground and airborne) or failing to properly monitor approach or departure flight path with possible dire consequences.

Reducing level-off restrictions and heading changes during SID climb-outs along with some of the rapid airspeed changes, power reductions, sharp turns and configuration changes required for noise abatement could lower the distraction-due-to-workload and enhance the see-and-avoid concept. Even so, cockpit crews must always divide their attention among many competing inputs. But perhaps this discussion, distilled from the voluntary reports of crewmembers who have actually experienced hazardous situations due to distraction, may serve to make us all aware of our own human susceptibility as a giant first step in learning how to manage and control distractions in order to avoid tragic mishaps.

Know Your Enemy


Clouds overshooting the anvil are evidence of strong updrafts.
Anvil flow indicates direction and speed of high altitude winds.
Hail can occur in clear air within 10 miles of the storm.
Rate of storm growth may exceed aircraft's climb capability.
WARNING. Severe turbulence can occur at all altitudes in a storm.
Hail most frequently encountered between 10,000 and 30,000 feet, but has been found up to 45,000 feet.

MAC Standards: Plan all flights to avoid areas of forecast or known severe weather. Avoid thunderstorms and cumulonimbus clouds. During climbout, enroute and descent avoid them by 20 nm at FL 230 and above, and by 10 nm below FL 230. Do not fly directly above a thunderstorm unless you can top it by 2,000 feet. Avoid rain shaft and cloud base of storms by 10 nm. During takeoff or landing you must avoid any thunderstorm or cumulonimbus clouds and associated gust front. The distance from the storm must be increased as soon after takeoff as possible to meet climbout separation criteria. When landing, a missed approach course must be available which will provide separation similar to that for departure. (Check your aircraft's Dash One and MACR 55-series for detailed instructions.)


Updrafts of warm air moving at over 6,000 fpm.
"Cauliflower" indicates the storm is still growing.
Icing usually occurs from 0° C to 20° C.
Lightning
95% of lightning strikes are below 20,000 feet and within 8° C of the freezing level.
Freezing Level
Most frequent encounters with icing and lightning are within 5,000 feet of freezing level.
Updrafts may exceed 6,000 fpm.
Downburst: downdraft velocity
WARNING: Severe turbulence under the base of storm. Do not fly under the base of a thunderstorm.
Lightning
Hail
Rain
Gust front: invisible cold, high-velocity air flow preceding the main downdrafts and the storm by 10 to 15 miles.
Strong and variable crosswinds, often out of aircraft limits.
Hydroplaning on wet runways

The Understatement

Misperceived mission priorities leave a helicopter crew hovering on the edge of disaster.

by Capt Gary Perkins
Det 18, 38 ARRS, Plattsburg AFB, New York

The desert was hot, really hot. The man under the tent awning told me it was 110° in the shade, and I didn't doubt him a bit. Tired and thirsty, I turned and scanned the horizon. I was covered with dust, had a headache and was desperately in need of a bathroom. I went into the Civil Air Patrol trailer to talk to the colonel running the show. He looked like the desert I'd just surveyed; his face was as lined as the dusty hills around us. He looked up at me when I came into the room, and then at the map thumbtacked to the wall. "We still haven't found him," his voice, surprisingly soft, sounded like the desert wind outside. His words were no surprise; I didn't really expect to find him: a boy lost in the desert for three days with no water. Temperatures went up to 120° during the day and dropped close to freezing at night. No, there was not much chance, but we were still trying. "Take the search dogs over to the brown gulch area, lieutenant, and let them try there. Maybe we'll get lucky, who knows?" Once outside again, I surveyed the scene. It reminded me of a frontier movie set. People from everywhere were pulling up and parking their campers, putting up tents and concession stands, and positioning porta-toilets. Well, at least I had found one thing I needed.

Feeling better and on my way back to the helicopter, I passed two rows of tents with men playing dominoes, women cooking, and children asking, "Can we go home, now?" It was almost a carnival atmosphere. I'll never understand it; as soon as word of a big search is out, people flock to the area-in this case creating a regular side show in a corner of the desert abandoned long ago by even the Shoshonis.

Then we were back in the air again. We had already ferried those dogs for four hours that day, searching different areas. They were seasoned travelers by now. I glanced back at the dogs and their handlers. Fatigue and hopelessness showed on even the animals' faces. Landing in the sagebrush, we let them out and shut down the engine. There was nothing to do but sit and wait while they searched the area. The PJ, stripping to the waist, climbed on top of the helicopter to get a tan. I cautioned him about getting burned, but my suggestions fell on deaf ears. I closed my eyes momentarily and leaned my head back.

Soon the trackers returned—there had been no sign of the lost boy so we headed once more for the CAP trailer with dogs, handlers, and a photographer on board. Suddenly, the radio crackled to life. The local Flight Service Station wanted to know if we were a rescue helicopter. There had been a crash on top of a 10,000-foot mountain at the edge of the desert. "Can you proceed to the site?" the radio urged. The copilot, peering over the maps with his plotter and computer, looked at me and nodded. But we can't stay long, I thought to myself, looking at the fuel gauge. We dropped off the dogs and handlers with a ground party, but the Air Force photographer pleaded eloquently to go along. Although I wanted to take him, I felt it was best to make the helicopter as light as possible. We left him to spend the night in the desert with the others.

The mountains surrounding the desert were beautiful. What a change in a few miles! We climbed to 10,000 feet and began to search along the mountain top. Turning over the controls to the copilot, I got out my chewing tobacco. Foul stuff, I thought, but I was trying to quit smoking again.

Suddenly, the wreckage was directly in front of us and I wheeled the helicopter around and landed in a clearing on the peak. I didn't even bother to perform a power check or a high and low reconnaissance pass. In my excitement to get to the wreckage, I forgot the basic rules of helicopter mountain operations. I noticed that we touched down rather hard, almost as if the helicopter couldn't hover, but I didn't pay much attention since we were down safely. That was all that mattered at the moment, wasn't it? The PJ jumped out and ran toward the wreckage. "You know," said the copilot, "we should have had him take a survival vest or at least a radio. Maybe we should have worked out some hand signals."

"Good idea," I replied, watching the PJ drop out of sight over the side of the mountain. There we sat with the minutes ticking slowly by. There was no sign of the PJ. Finally, the mechanic, putting on a sur-

Honorable Mention, 1980 MAC Flying Safety Writing Contest

vival vest, went out to find him. He was not gone long. Trotting back, he panted in the thin air of the mountain. "He's way down the side," he gasped, leaning against the helicopter. "What do we do now?"

I rolled the throttle back in and took off. The helicopter didn't feel right, but I decided that it was just my excitement. We soared by the side of the mountain and saw the PJ frantically waving at us. He was about 500 feet down the side. I wondered how he'd gotten that far since the mountain looked almost perpendicular. He was giving us a hand signal. "I think that means the fellow's still alive!" shouted the copilot excitedly. "That signal means he's dead," said the mechanic at the same time. So much for hand signals, I thought to myself. "Well, I'll just bring this bird to a hover on the ledge and get a closer look," I announced.

"How about a high and low recon?" the copilot asked in a small voice.

"No time for that stuff now," I discounted as I headed straight toward the mountain.

When I slowed the helicopter, it became suddenly apparent that it was not going to hover. No doubt about it, we were slowly descending. Frantically, I looked around us. Just to the right, I saw an area where we might put it down, but the ledge wasn't big enough for the skids. Only the front part of them was on the rock; the rest hung out over the sheer drop off. With the cyclic full forward, the helicopter sat precariously on the ledge. The blade was busy chopping down a bush in front of us. I looked at the copilot, but he had his eyes tightly closed. I didn't blame him; I didn't feel any too well myself. I had swallowed my tobacco when I tried to bring the bird to a hover, and now my stomach was churning like an out-of-control washing machine. The mechanic jumped out and ran over to the PJ. When he came back and climbed into the helicopter, it started rocking backward slightly, but quickly settled down. "The man's dead," reported the mechanic. "Do you want to bring him out?"

"Might as well!" I replied. But even with the body full forward in the cargo compartment, the helicopter started rocking again. "Tell the PJ to climb back to the top, we'll pick him up there," I told the mechanic.

Having done what I asked, the mechanic climbed back in and tried to sit in his normal place. "Move forward, quick!" I shouted, as the helicopter started tipping backward. He did but that still wasn't enough. The copilot, with his eyes now wide open, put his hands over the vital switches and the mechanic sat on the console between us. We made a backward diving takeoff. After a frightening thousand feet, I had the machine under control again, and we headed for the PJ.

At the clearing on the mountain top, we made a slide landing. The local sheriff was there in his jeep to take the remains. "How did he ever get that jeep up this mountain?" I wondered aloud. It certainly looked inaccessible to me. The PJ climbed in and we took off for home. Looking up from his figuring, the copilot said, "It appears we have enough gas to get home with a 50-pound reserve." That's just five minutes flying time, I thought.

"We're cutting it very close, sir," offered the mechanic, as if in echo.

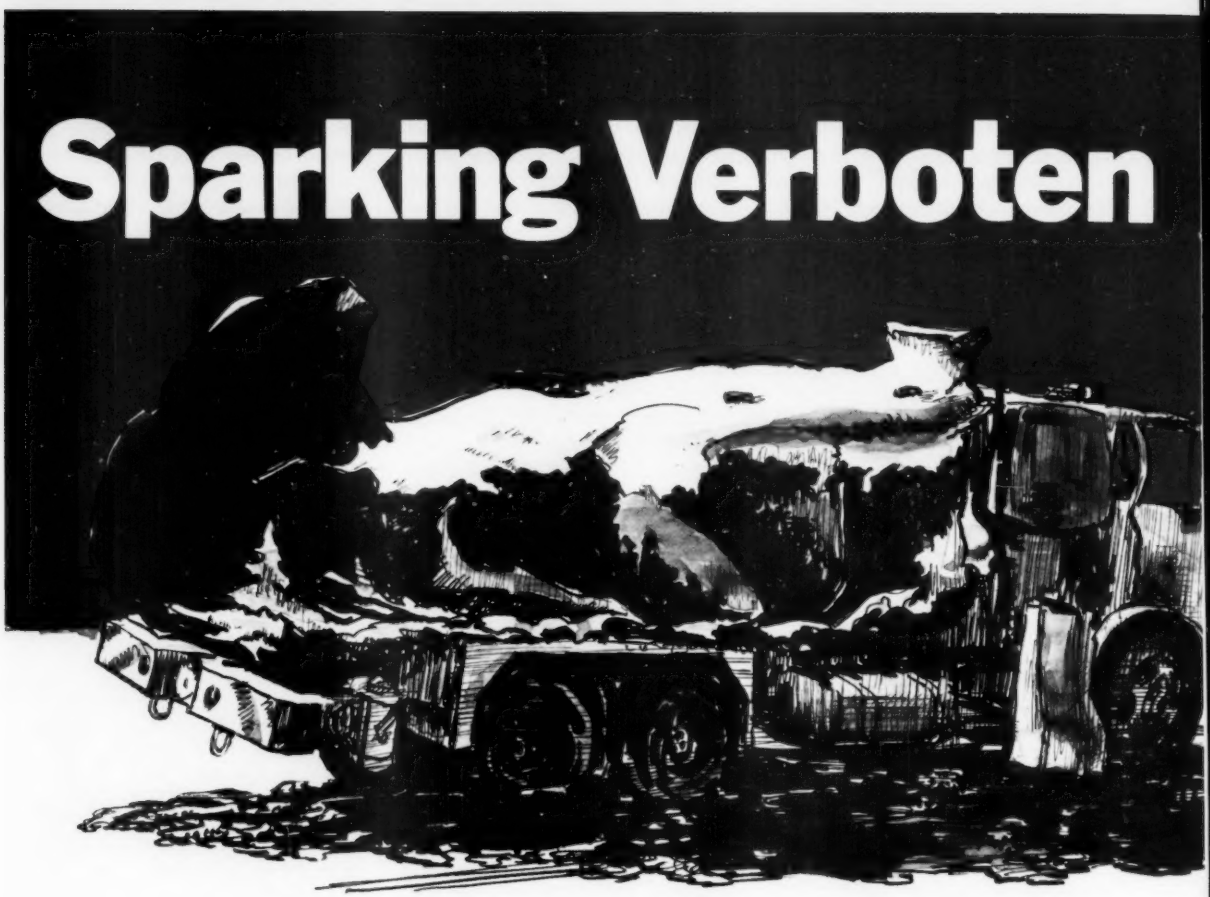
"Too close," I agreed silently. "I think I'll follow the highway home," I said firmly, "just in case we have to put her down."

We rode in silence for the next few minutes, all of us thinking about the day's events. We were glad the sheriff had told us that the lost boy had been found in time—barely alive, but with an excellent prognosis. "You know," the copilot said, as if it had just occurred to him, "we made a few mistakes today." I grinned sheepishly in response. That was one thing I had always liked about this guy: his wonderful understatements.

ABOUT THE AUTHOR

A native of Texas, Captain Perkins graduated from Stephen F. Austin State University, Nacogdoches, Texas, in 1971. After UHT, he was assigned to Mountain Home AFB, Idaho, where he flew HH-43s, HH-1Hs and UH-1Ns. Leaving active duty in 1975 to become a school teacher, Gary returned to school briefly to get his state teaching certificate. During this period his part-time employment included being a cemetery caretaker. Once he had the certificate, he moved further south and taught math in a small school near the Gulf Coast. He then decided to go back to school himself to become a watchmaker, and was occupied for several years in that profession. After a brief stint as a salesman for a steel company, Captain Perkins returned to active duty in 1979 and was assigned to the rescue detachment at Plattsburgh AFB, New York.

Sparking Verboten



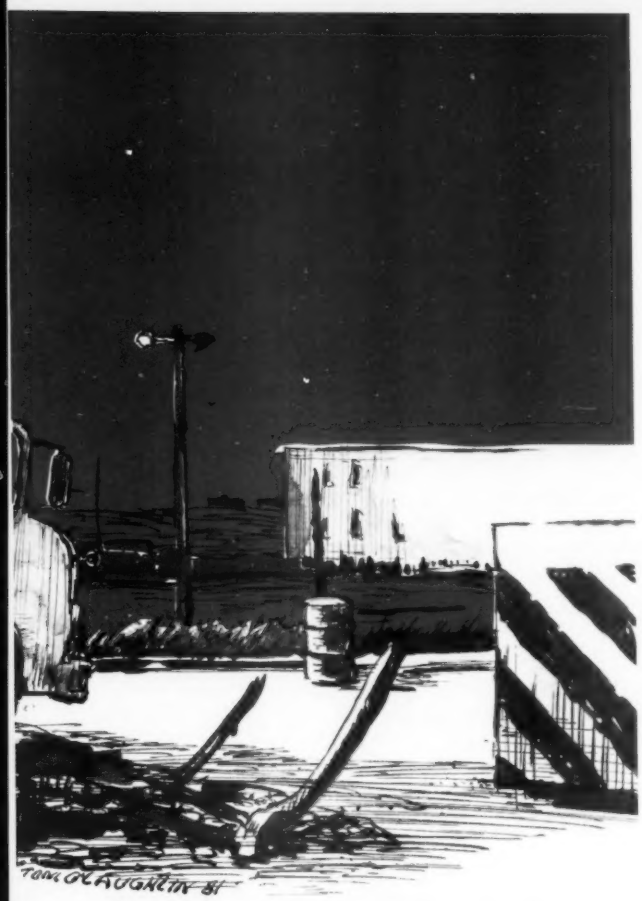
No, "sparking verboten" is not a sign posted in some public park, nor does it have anything to do with springtime and young lovers. In reality, these words allude to aviation turbine fuel (JP-4 to MAC flyers)—more specifically, to a recent fuel additive designed to reduce the possibility of electrostatically induced fires. It does its job by helping to prevent static electricity sparking that could occur during refueling operations.

Until recently, adequate grounding and bonding of both aircraft and servicing vehicles was the only means we had to prevent static electricity buildup during refueling. In addition, we followed the prescribed practices such as not servicing aircraft during electrical storms and making sure no radar or other electrical equipment was being operated.

These and all other safety procedures related to servicing operations must *still* be followed. The use of the conductivity additive in fuel in no way lessens the need to comply with all refueling safety requirements and policies currently in T.O. 00-25-172. The additive simply gives a measure of protection by decreasing the static electricity buildup in the fuel itself. But it's important to keep in mind that fuel is only one source of static buildup.

Sparks from Aircraft

When aircraft are being refueled, static sparking can occur from either the aircraft or from the fuel. Even a parked aircraft can develop a static charge by the action of air flowing over its surfaces. This is the result of friction between two dissimilar materials. If the air happens to be filled with ice



crystals, snow, or dust particles, a greater charge can build up. In flight, an aircraft will develop an even greater charge because of its speed. It may also acquire an induced charge by being flown near charged clouds. During the landing roll of a fixed-wing aircraft or while ground taxiing any aircraft, an electrical charge can build up due to the friction between the tires and the pavement. But regardless of how a static charge develops on the surface of an aircraft, its existence can produce a spark. If such sparking should occur in the presence of fuel vapors, a fire or an explosion could result.

Sparks from Fuel

Aviation fuels themselves can acquire or build up a charge of static electricity. The amount of charge that will build up within a fuel depends on a number of variables. These include the type of fuel being used, the amount and kind of impurities such as air, water or particulate matter present, and the rate of fuel flow. Atmospheric conditions such as low humidity also increase the likelihood of static buildup. Since JP-4 has the ability to retain more impurities than AVGAS, it is more likely to build up and hold a static charge. As a result, it is more apt to discharge its electricity in the form of a spark.

A static charge develops when fuel rubs against unlike materials the same as it does when it flows through pumps, filters, pipes and hoses. During its flow through certain types of clay filters and microfilters, the charge may increase by as much as 200 percent. If the fuel is shaken, poured, stirred, or splashed, its charge will further increase.

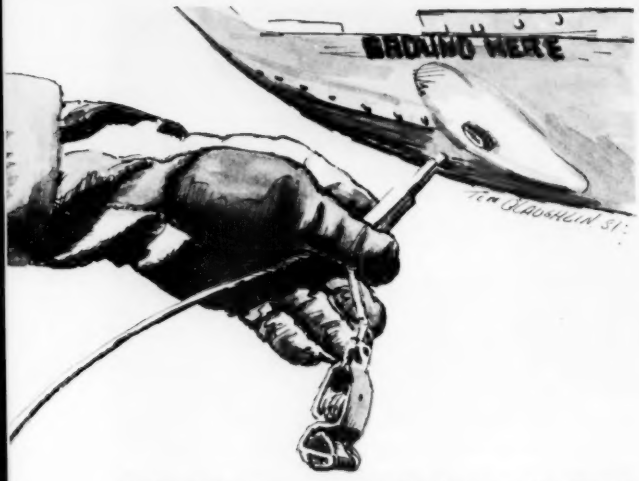
When the fill port is located at the top of the tank, fuel will splash and mist as the tank is serviced. This falling stream will stir up the fuel already in the tank. If the tank is conductive, the charge will leak off the fuel surfaces that touch the tank. However, the charge on the top surface of the fuel will stay in place for a few minutes because it does not touch a conductor.

Protection Against Static Sparks

Proper grounding and bonding procedures are the primary means of protecting people and equipment from the dangers posed by static sparks. These procedures include the grounding of both the aircraft and the refueling vehicles as well as the bonding of the fuel nozzle to the aircraft. While these necessary precautions eliminate the external static charge hazard, they have no effect on any internal spark potential that may exist between the charge in the fuel and the counter-charges on the tank walls.

If a high static buildup causes a discharge with sufficient energy and the vapor-air mixture in the tank is within the explosive range, an explosion within the tank may occur. This condition can result or be aggravated by poor fuel conductivity and is not necessarily influenced by external grounding methods. Consequently, standard bonding and grounding procedures will not eliminate all internal static electricity problems. Additional safety measures are needed.

Today, we have one such measure in the form of the conductivity additive. Its presence in the fuel will help prevent electrostatic buildup. It does its job by increasing the ability of the fuel to get rid of



static electricity and, thereby, lessens the danger of fire and explosion during refueling.

The practical value of a conductivity fuel additive can best be seen by examining a recent mishap—one that occurred because the fuel did not contain such an additive.

In this instance, an Army CH-47 helicopter landed on a pad for open-port refueling. After all the other tanks had been serviced, the crew chief proceeded to fill the left auxiliary tank. He had serviced the tank for about 30 to 60 seconds, pumping an estimated five to 20 gallons of fuel, when flames suddenly shot from around the open fuel port. He immediately took the refueling hose away from the opening and, with the help of another crew chief, extinguished the flames using a 15-pound CO_2 fire extinguisher. Inspection revealed no damage to the aircraft other than charred paint around the fuel cell opening. Only quick action by the crew chief and a sizable measure of good fortune prevented a catastrophe.

Investigators concluded that correct refueling procedures had been followed and all safety requirements were satisfied during the servicing operations. No equipment was defective, and no external ignition source was present. The ignition occurred as a result of a static charge built up and discharged from the fuel itself. This charge was generated by the JP-4 falling about three feet at a high fuel flow rate into the almost empty tank. The charge traveled to the fuel port opening and ignited the vapors.

The conditions that existed at the time of the mishap were very favorable for an accumulation of a static charge in the fuel and for ignition of the fuel vapors. The relative humidity was low, about 22 percent and the wind velocity was two knots. Ambient and fuel temperatures were around 100° Fahrenheit, considerably higher than during three similar MAC helicopter mishaps which occurred in the -10° to +43° Fahrenheit range. Had the JP-4 contained a conductivity additive, the static spark and resulting fire would most likely have been prevented.

Who's Got the Additive

Responsibility for mixing the additive in the proper concentration rests with fuel terminals. It will generally not be added at the installation level. Delivery of JP-4 containing the conductivity additive is presently being made to many CONUS USAF bases, including most MAC stateside bases, so you're either using it now or soon will be. Eventually, all overseas "watering holes" will be dispensing a less-static-prone fuel as well.

If the conductivity additive is to be included in all future jet fuel shipments, and if it is going to be added at the terminal and not at the installation, then why all the fuss about "antistatic" fuel? The reason goes back to the old saying that a little knowledge can be a dangerous thing. The common reference to this additive as "antistatic" could be misleading because it might give the impression that fuel containing it suddenly becomes resistant to static charges and, consequently, is safe. But nothing could be further from the truth. Such an erroneous attitude could lead people to become lax in following the required grounding and bonding procedures during servicing operations. The end result could be serious fire mishaps and needless injuries.

In fact, the additive is not antistatic in the sense that fuel containing it cannot build up or accept a static charge. It is a conductive agent that does its job by providing a low-resistance path for excess electrons to bleed off from the fuel to the aircraft surfaces and be grounded externally. If it is to do its work effectively, it is more important than ever that aircraft and servicing equipment be properly grounded and bonded during all refueling operations.

Researchers have developed the additive, and others are doing the work of insuring that it gets into fuel in the proper proportions. About the only thing aircrews and maintainers have to do is continue to closely follow established practices to reap the safety benefits and reduce even further the possibility of sparking a disaster while refueling.

--Adapted from *Flightfax*

The Viewer's GUIDE

Here's an update to the Airport Qualification Program list. They are available to any Air Force unit, and many are on the shelves at your local MAC learning center. You may order programs through the base audiovisual library or the Air Force Audiovisual Library, Norton AFB, CA. Programs that have been featured in the *Flyer's* "Deja Vu" are shown in bold print.

Place	Program No.	TMF Issue
Adak NAS, AK	Q7-1056	
Alameda NAS, CA	Q6-723	
Albuquerque IAP, NM	**Q6-366 (1)**	**Feb 79**
Alice Springs Aprt, Australia	QT-841	
Altus AFB, OK	Q6-461	
Amberly RAAFB, Australia	QT-842	
Andersen AFB, Guam	**Q6-473**	**Nov 77**
Andrews AFB, MD	**Q6-458**	**Dec 79**
Ascension Island AF Aux	**Q6-442**	**Oct 77**
Barbers Point NAS, HI	Q6-346	
Barksdale AFB, LA	Q8-1551	
Beal AFB, CA	Q6-348	
Bergstrom AFB, TX	Q6-819	
Buckley ANGB, CO	**Q6-597**	**Apr 81**
Cagayan de Oro, Philippines	Q8-1397	
Cape Lisburn AFS, AK	Q7-915	
Cape Newenham AFS, AK	Q7-911	
Cape Romanzof AFS, AK	Q7-912	
Carrasco IAP, Montevideo, Uruguay	Q6-447	
Charleston AFB, SC	Q6-449	
Cheju, Korea	Q8-1405	
Christchurch IAP, New Zealand	Q6-479	
Chunchon, Korea	Q7-1311	
Clark AB, Philippines	**Q6-352**	**Feb 80**
Coolidge Aprt, Antiqua	Q6-920	
Cubi Point NAS, Philippines	**Q6-353**	**Aug 78**
Dakar/Yoff, Senegal	Q6-441	
Dover AFB, DE	Q6-450	
Dyess AFB, TX	Q6-456	
Eielson AFB, AK	Q6-466	
El Toro MCAS, CA	Q6-354	
Elmendorf AFB, AK	**Q6-355**	**Oct 80**
Fort Campbell AAF, KY	**Q6-460**	**Jun 79**
Fukuoka Aprt, Japan	Q7-363	
Galena Aprt, AK	Q7-959	
General Lyman Fld, HI	**Q6-356**	**Jul 77**
George AFB, CA	Q5-060	
Grand Forks AFB, ND	Q9-1793	
Guantanamo Bay NAS, Cuba	**Q6-357**	**Dec 77**
Hickam AFB, HI	**Q6-360**	**Aug 80**
Hill AFB, UT	**Q6-454**	**Apr 78**
Hoengsong, Korea	Q7-1312	
Howard AFB, Panama	**Q6-362**	**Mar 78**
Indian Mountain AFS, AK	**Q7-914**	**Aug 77**
Iwakuni MCAS, Japan	**Q6-496**	**Sep 78**
J. F. Kennedy IAP, Bolivia	**Q6-364**	**Jan 78**
Jan Smuts Aprt, South Africa	Q6-437	
Kadena AB, Okinawa, Japan	Q7-905	
Kaneohe Bay MCAS, HI	Q6-365	
Kanghung, Korea	Q8-1404	
Keesler AFB, MS	**Q7-904**	**Jan 80**
Kelly AFB, TX	**Q8-1550**	**May 80**
Kimhae IAP, Korea	Q7-1313	
King Salmon, AK	Q7-961	
Kodiak Aprt, AK	Q9-0041	
Kunsan AB, Korea	Q6-471	
Kwang Ju, Korea	Q7-1309	
Lajes Field, Azores	**Q6-368**	**Sep 80**
Learmonth Aprt, Australia	QT-840	
Little Rock AFB, AR	Q6-457	
March AFB, CA	Q5-059	
Mariscal Sucre Aprt, Quito, Ecuador	**Q7-918**	**Apr 79**
Mather AFB, CA	Q6-369	
McChord AFB, WA	**Q6-453**	**Jul 78**
McClellan AFB, CA	Q6-370	
McGuire AFB, NJ	Q6-451	
Moffett NAS, CA	Q6-373	
Nellis AFB, NV	**Q9-1779**	**Oct 79**
Norfolk NAS, VA	**Q9-0042**	**Jun 77**
Norton AFB, CA	**Q5-047**	**May 78**
Offutt AFB, NE	Q8-1500	
O'Hakea RNZAFB, New Zealand	QT-843	
Osan AB, Korea	Q6-470	
Pago Pago, American Samoa	**Q6-476**	**May 77**
Pease AFB, NH	Q8-1501	
Perth IAP, Australia	QT-839	
Peterson AFB, CO	**Q6-598**	**Aug 79**
Phoenix Ski Harbor IAP, AZ	Q9-0079	
Pope AFB, NC	Q6-455	
Presidente Stroessner Aprt, Paraguay	Q6-448	
Prestwick IAP, UK	Q6-414	
Pudahuel IAP, Chili	Q6-445	
RAF Lakenheath, UK	Q8-1544	
RAF Mildenhall, UK	Q6-413	
RAF Upper Heyford, UK	Q8-1611	
Ramstein AB, Germany	**Q6-417**	**Mar 79**
Richmond RAAFB, Australia	Q6-477	
Robert Gray AAF, TX	**Q6-459**	**Feb 78**
Rota NAS, Spain	Q6-412	
Scott AFB, IL	Q6-599	
Seneca AAF, NY	Q7-916	
Shemya AFB, AK	**Q6-465**	**Jan 81**
Sondrestrom AB, Greenland	**Q6-377**	**Sep 77**
Sokcho, Korea	Q8-1403	
Sparrevohn AFS, AK	**Q7-913**	**Oct 78**
Taegu AB, Korea	**Q7-906**	**Dec 78**
Tatalina AFS, AK	Q7-960	
Templehof AB, Germany	Q6-415	
Tin City AFS, AK	Q7-962	
Toncontin IAP, Honduras	Q7-917	
Travis AFB, CA	Q9-1708	
Wainwright AAF, AK	**Q7-910**	**Jan 79**
Yokota AB, Japan	**Q6-467**	**Nov 78**

DEJAVU

Buckley ANGB, Colorado

(elevation 5,663 feet)

The primary hazard to consider when flying into Buckley is not its easily recognizable high field elevation or its location just 30 miles east of the Rocky Mountains, but its less obvious proximity to Denver's Stapleton International Airport. The ILS final approach course for Stapleton's primary arrival to runway 26 is about two miles north of the Air Guard Base. Additionally, the Denver TCA borders the base's airspace.

Arrivals to Buckley are normally from the southeast, with runway 32 (11,000 feet long) preferred. Precision radar approaches are available to runways 32 and 26.

There are six civil airfields within 15 miles of Buckley and they generate a considerable amount of VFR traffic when the weather is good. Arapaho Airport is 10 miles southwest of the base and many civilian training flights operate south of Buckley just outside of the Denver TCA and on the fringes of the base's traffic area.

Southeast of the base, the terrain slopes upward at a rate of about 95 feet per mile. Because of Buckley's high field elevation, some heavily loaded aircraft may not be able to meet minimum safe climb criteria on hot days. When the weather is warm, a close look at the performance charts is wise. As with any arrival into a busy air terminal, heads-up posture approaching Colorado's mile-high capital will help crews avoid mountains, near misses, and airspace violations.

—Adapted from ISD-Q6-597

Taxiways joining runway 14 from the right in this photo have a significant upslope toward the runway.

Overview of the base looking to the northwest shows general layout and the cross runway (08/26).

This view of runway 32 from short final shows the heavy rubber deposits. The parking ramp is at the far end of the field to the left.

C.R. TERROR

The Portly Pilot takes a short break from military flying and bags a civilian citation.

Squinting against the brilliant morning sun, C.R. Terror and his copilot, Sam, watched the blue staff car, which had just picked up their VIP passenger, pull out of sight. After stretching, scratching and yawning ferociously, the Ace of Aerospace was the first to speak.

"Well, Sammy, here we are in the Land of Sky Blue Waters with the better part of a day to kill while the boss does his thing at the special Academy Air Power Seminar," he managed to get out before nearly being overpowered by another gigantic yawn.

"All the general said was, 'Be ready to block out for home at 1830'," reminded the long-suffering copilot, "so I guess we can do whatever we want until then. Got any ideas?"

C.R.'s puckish puss suddenly illuminated with an intensity which threatened to challenge the brilliance of the Colorado sunshine.

The Paunchus Pilot slid out of his seat and motioned for his sidekick to do the same. "I just ran a quick search of my computer-like memory bank of friends and acquaintances worldwide," he announced with mock modesty, "and I believe the old brain cells have identified a winner abiding in this locale. It's still early enough in the morning that we should be able to catch him at his condo, especially since today's Saturday."

"Anybody I know, boss?" inquired the curious copilot, quickening his pace to keep abreast of C.R. as the fast-moving major headed for the Peterson Field base ops.

"Be patient, Sammy, m'lad," teased the Heavy Honcho breathlessly, "and soon enough you shall find out." Once inside base ops, C.R. consulted a tiny, tattered black book which he had produced from an obscure compartment in his genuine Thai elephant-hide wallet. Locating the phone number he was after, he promptly commandeered the ops dispatcher's class-A telephone line. With the circled thumb and forefinger gesture for A-OK that the Portly Pilot flourished, Sammy had no trouble discerning that his boss had made contact with the desired party.

"Hello, Pueblo? This is C.R.," announced the Rotund One gleefully. "Whaddaya mean, 'C.R. who?'? C.R. Terror, the one and only, of course!" Placing his pudgy palm over the handset mouthpiece momentarily, C.R. volunteered a reassuring aside to Sammy, "Pueblo Pike's a great kidder—likes to make me think he doesn't remember the World's Greatest Aviator, who also just happens to be one of his oldest and best pals."

Returning to the telephone, the Flabby Freeloader apologized

for having awakened his friend and then pressed on in earnest with the business of securing some fun and games for the day at Pueblo's expense. "Hey, good buddy, if you aren't already booked up today, maybe you could give me and my impressionable young copilot a dog-and-pony tour of your air service operation. I haven't seen you since you hung out your shingle over at Mile Hi Muni. You aren't? You Will? Great, we'll be outside Pete Field base ops waiting with bells on."

Half an hour later a four-wheel-drive RV with the words "PIKE'S PEEK" emblazoned on the doors in eight-inch tall irridescent letters arrived. "Welcome to the High Country," proclaimed the robust, full-bearded figure clad in a plaid flannel shirt and a sheepskin vest who was piloting the lofty jeepster.

"High Country is right, Pueblo," wheezed the Corpulent Carper as he struggled to hoist his portly posterior into the vehicle. "You practically need mountain climbing gear to get aboard this highrise rec machine." Sammy was impressed with the unusual logo on the RV and couldn't resist asking about it as soon as he was able to get a word in edgewise.

"We added sightseeing charter flights to our repertoire awhile back," explained Pueblo, and I think the logo is kind of a catchy takeoff on my last name. Don't you?"

"Ah, yes," interrupted C.R., "You always did have a way with words. If my memory serves me correctly, you even won an honorable mention in *The MATS Flyer* writing contest back when we were flying Old Shakey's for MATS. Obviously, you are still as quick with a quip as ever. But, tell me Pueblo, how is business now that you're a full fledged aerial entrepeneur?"

As they turned off the main highway and headed down an aspen-lined secondary road Pike replied. "Basically, business is booming. In spite of inflation and all the economic horror stories you hear about, Pike Aviation Inc. is alive and healthy. You'd be surprised how much business there is if you're willing to work on a 'you call, we haul' short notice basis—like we did, and you probably still do, in MAC. As a matter of fact, I just acquired a Cessna Citation so I

can start cashing in on some of the commuter traffic out of Denver."

"I thought you were gonna give us the 50-cent tour of your flying circus, but it looks like we're headed for the toolies on *this* road," commented C.R., "Where are we going now?"

"Patience, my friend, patience," soothed the bewhiskered driver, "I have to pick up somebody on the way out to the airpatch. Being an ardent admirer of the feminine gender like you are, I believe you will be glad we did, especially since the lady in question kindly agreed to share the activity we had planned for just us with you and Sammy—because you're special visitors."

Rubbing his pudgy paws together in instant anticipation, the Lothario of the Low Country was visibly elated at this turn of events. Soon they turned onto a gravel lane leading to an alpine style A-frame. Before Pike even had the RV completely stopped, a tall, lithe female in jeans, boots and a sheepskin vest and flannel shirt matching Pueblo's came bounding down the cabin's steps. She had a large picnic basket on one arm and a blanket roll under the other. Up close, her striking olive-toned facial features were framed by two long hanks of blue-black hair.

"Boys, I'd like you to meet my Indian Princess, Mazie Corn Tassels. Mazie, meet my old friend, C.R. Terror and my new friend, Sammy, who flies with him for the Air Force. As the stunning young woman slid into the front seat that C.R. had smoothly vacated, Pike pointed out, "Mazie teaches structural engineering at the university and has a multi-engine commercial pilot's rating."

"Pleased to make your acquaintance, Miz Tassels," said C.R. and Sammy.

"Feel free to call me Mazie," she offered in a voice which was somewhat husky, but retained an undertone of enchanting effervescence. The rest of the way to Mile Hi, C.R. was in a state of near euphoria as he chatted with Pike and basked in the radiance of their comely companion.

"Well, here we are at last, and there she is—my pride and joy," proclaimed Pueblo as they pulled up in front of an open hangar with the sleek nose of the Cessna bizjet visible just

inside. "What say we take 'er out for a ride, C.R.?"

"Twist my arm," bandied the Fraudulent Funster, quickly adding, "Say, Pueblo, d'ya recon I could take her around the pattern once or twice?"

"Help me roll her out of the hangar and I'll do better than that, old buddy," volunteered Pike, winking at Mazie. "One thing, though, is your FAA ticket still valid?"

"You better believe it is," returned C.R., "and not only that, I'm current in our aero club's twin Cessna and have a 'Sabreliner stamp' on my commercial."

"Shoot, considering that and the fact that you fly Uncle Sam's Sabreliners, you're probably about as qualified to handle this little beauty as I am. I'll play copilot and leave the drivin' to you—I get all the flying time I need every day of the week," offered Pueblo.

"Oooweee, you're on," babbled the Overconfident Buffoon as they eased the Cessna out of the hangar. "And you're right, transitioning to your Citation should be a snap. By the way, Mazie" the Naive Knave warned, "don't forget the lunch basket—we might decide to have a little inflight feast while we're up!"

Seated comfortably in the plush seat behind his boss, Sammy was beginning to have some vague second thoughts about his Mischievious Mentor's potential proficiency in an unfamiliar airplane, but he was swept along in the wake of his companions' high spirits and C.R.'s *overwhelming* display of blissful exuberance.

"Hey, what a dreamboat of an air machine," appraised the Prodigious Pilot as he completed a surprisingly smooth first touch 'n' go. "Why don't we shoot two or three more approaches and then buzz around and take in some of the local scenery?"

"Okay by me," assented the agreeable Pike, "You seem to be enjoying yourself and you've taken to this airplane like a bee takes to honey." Following a couple more nonstandard visual patterns the Ambient Aeronaut elected to try a no-flap approach. "This beauty is a real sweet airplane all right—the biggest piece of cake I've ever flown," boasted the Aviator with Avoirdupois as he whifferdilled around from his approximation of a base leg and started barreling down final. "By the way, Mazie," he questioned casually over his shoulder, "has the old Piker here let you get your pretty little digits on the controls of his pride and joy yet?"

"No, he hasn't," admitted Pueblo's princess with a mock pout, "but if he did, and I was where you are on final approach, I think I would have lowered the landing gear by now."

Coughing in a vain attempt to disguise his acute embarrassment at being caught in an obvious oversight—and by a member of the fair sex, yet—C.R. tried to put the ball in somebody else's court by making a dramatic exaggeration of getting the gear handle down and then chiding Pueblo, "You should have challenged me on the lack of undercarriage, brother Pike—you're slipping, heh, heh!"

"I was too busy watching your airspeed, old buddy," parried the copilot. "Judging by the checklist you're several knots low for a no-flap approach," he observed with a look of concern.

The Field Grade Fumbler was just about to utter, "Nonsense," when the additional drag of the fully deployed landing gear increased the Cessna's sink rate infintely quicker than he could compensate for it. The twin-jet finished the approach prematurely, and with flight characteristics approximating those of an elevator with a broken cable. Impacting considerably shy of the overrun, the Cessna popped both main tires when they failed under the stress of more landing forces than they were designed to withstand. When the crippled Citation had flumoed to a halt, about all the Flying Fool could manage was a sheepish grin and an offer to pay for the damages, whatever they might be.

Cool as always, Pike reassured the Ashen Aviator that he was plenty well insured for just such contingencies, adding, "I'm real thankful that nobody was hurt." After everybody had deplaned, surveyed the situation and consoled themselves that they were indeed lucky, and that things could have been a lot worse, the Dauntless Daredevil's crestfallen countenance suddenly brightened. "Every cloud, as they say, does have a silver lining," he waxed eloquently, poking a pudgy index finger profoundly into the air, "and even this apparent debacle is perchance a blessing in disguise."

"How the heck can you possibly say *that*?" came a chorus of challenges from Pike, Mazie and Sammy in quick succession.

"Quite simple, my friends. We, ah, 'landed' right next to a grove of trees which would appear to be an ideal spot for a picnic. Mazie, why don't you break out the wicker container of consumables? We just have time enough to pamper our pallets with a pastoral repast, hike to the hangar where the RV is parked and make it back to Pete Field in time to pick up the general and zip him home."

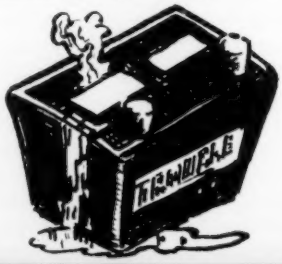
QUICK STOPPERS

"Friendly" Incoming

Breakdowns in communication can be annoying and costly. Just how costly is illustrated by this recent incident. A Marine patrol was dug in and camouflaged as part of an exercise conducted on a large gunnery range. Naturally, they had coordinated their presence with the Air Force organization responsible for range operations. Just as they were settling in, their silent stakeout was violently disturbed by live machine gun fire from an Air Force helicopter making a firing pass perilously close to their position. This kind of realism was more than the ground troops had bargained for or expected on this particular patrol, so they promptly fired a flare to call off the "attacking" Jolly Green. Although the rescue folks had coordinated with the same "responsible" organization prior to their gunnery mission, they had not been told about the presence of ground troops on the range. Not informing those that had a lot more than just a passing interest in the situation in this case came ever so close to being a *fatal* oversight.

A Battery Is a Battery Is a . . . ?

Here's an incident that happened aboard a MAC C-130 which would tend to increase the healthy skepticism of the most credulous crewmember toward cargo manifests and what they say is being shipped. The Hercules crew was flying a standard cargo mission and had stopped to upload about 300 pounds of loose cargo and mail. The manifest identified some of the boxes as dry-cell batteries which were promptly loaded and secured. By the time they arrived at the next stop, however, the sharp-eyed loadmaster noticed that the bottom of one of the boxes was wet. When he tried to pick it up, the bottom fell out revealing very wet-cell batteries, packages of sulfuric acid and spilled battery fluid. The crew managed to clean up the corrosive mess before it damaged the airplane or burned anyone. Not correctly identifying and handling cargo plus improperly packaging it, resulting in leaks of hazardous substances during flight, is a double-barreled blunder aimed point blank at aircrews who, as always, are not only the last line of defense for accident prevention, but also must bear the brunt and possible consequences of such pernicious errors committed by others.



Inflation Hits Navy Orion

Can-do spirit can be a great thing. It has helped to win battles and made possible mission accomplishments far beyond the planner's original estimates.

Can-do spirit can run amok when safety rules are disregarded or it isn't tempered with common sense. In such situations the result of the best intentions can be a calamity instead of an achievement. Take the example of the two Navy troops who were attempting to muscle a multi-person liferaft up a P-3C Orion's boarding ladder. Halfway up, the swabby pulling from above slipped and accidentally actuated the CO_2 inflation cartridge. Naturally the raft began to balloon rapidly, and in a desperate attempt to keep it from damaging the handrails as it expanded between them, the bottom swabby stabbed it with his knife. The relatively small hole made by the blade quickly developed into a huge, irreparable tear as the high-pressure gas whooshed out, but in its death throes the liferaft managed to severely warp both handrails.

Now, normally, a heavy, 12-person raft is hoisted aboard a P-3 using the hydraulic lift on an ordnance truck. In this case, naturally, a hydraulic assist wasn't readily available, so a gung-ho petty officer, carried away with a fit of can-do enthusiasm, recruited a duty driver to help him. Together they attempted to wrestle the unwieldy liferaft up the Orion's ladder. When the duty driver slipped, he grabbed the wrong handle and the rest is history. The result of this highly motivated but poorly executed performance: $400 worth of aircraft handrails and a $1,500 liferaft down the tubes.

—Adapted from USN *Weekly Summary*

We've Lost Number Four--Almost

The Herk was turning final during a local training mission when suddenly a loud bang shuddered through the airframe and number four throttle simultaneously shot forward to the stops. The sudden jolt became a momentary uncontrolled oscillation in pitch, roll and yaw and the airspeed dropped ten knots. The instructor pilot in the right seat immediately feathered number four prop and raised the landing gear, while, at the same time, telling the left-seater to lower the nose to regain airspeed. Meanwhile the loadmaster reported that the right outboard prop looked as if it was really about to fall off and was still rotating at about 20 rpm in its tilted down position, producing considerable vibration. Smoke was also coming from the nacelle. The IP pulled the fire handle to shut off all fluids to the engine and the engineer isolated the right-wing bleed-air system. After completing the shut-down checklist and declaring an emergency they turned back toward the runway and configured. Not knowing if the dangling prop would tear loose and cause further damage, the pilots prepared for a possible crash landing as a precaution. The crew skillfully completed a 50-percent-flap approach to a full-stop landing. Back on the deck everyone evacuated with no further problems. Maintenance found that the reduction gear assembly had disintegrated and subsequent failure of the gear housing caused the prop to move forward and tilt down about 12 degrees and five degrees to the right. This accounted for the sudden forward throttle movement. Further inspection revealed the reduction gear's main drive gear was broken in half with several parts missing, apparently hurled through the cowling. The crew had done an excellent job in safely recovering the damaged Hercules without further incident.

Qs

On-The-Job Straining

An eager young Air Force photographer was shooting pictures of various airplanes landing and taking off as part of his on-the-job training. Things were going swimmingly and he was getting some great shots until a C-5 came trundling down the taxiway and lined up for takeoff. The photog was standing ten feet from the edge of the 150-foot-wide runway and about 25 feet behind the C-5's outboard engine. As the fan jets spooled up for takeoff the lenseman lost his balance in the hurricane-force jet blast and suddenly found himself airborne along with his camera, tripod and other gear. He crash landed several feet downwind on the asphalt, scraping his knee in the process. He was very fortunate to get away with only a banged up knee because, according to the C-5 Dash One, even at taxi power the blast as far as 50 feet behind the Galaxy's engines is a 150° Fahrenheit gale moving at 120 mph. Definitely a hostile environment for people or just about anything else for that matter.

For the Want of a Nail

We've all probably heard the old yarn about the lack of a nail in a certain horse's shoe eventually contributing directly to the fall of an entire kingdom. Well, for want of the proper size sheet metal screw, a CT-39 Sabreliner crew recently had a similar experience. Here is the thread of events as discovered by investigators. First, instead of a half-inch-long screw, someone had used the giant economy size that was a full inch longer than normal to help secure the flight station entrance-way trim panel. As the fickle finger would have it, the extra long sheet metal fastener in turn interfered with something else—in this case a wire bundle behind the panel. Because the bundle had no protective rubber boot around it, the sharp point eventually poked into the wires. One of the severed wires went to the hydraulic-low-pressure switch and another controlled the hydraulic-pressure-warning-light system. To further complicate the situation, the high-pressure switch to the hydraulic pump was defective, causing the hydraulic pump to stop working. With the wires cut, no master caution or annunciator lights came on to warn the pilots of the loss of pressure as they started to increase the engine power for takeoff. Fortunately, the eagle-eyed crew noticed something was amiss at about the time the engine power reached 90 percent and promptly aborted the takeoff. Unlike the proverb about the nail, we'll never know what might have eventually happened had the pilots not been so fast in recognizing the trouble, but then, we like this ending better anyway.

AFTER DEADLINES

CHIEF OF STAFF SPECIAL ACHIEVEMENT AWARD WAS PRESENTED TO MAC in recognition of exceptional flight safety accomplishments during 1980. General Lew Allen, Jr, USAF Chief of Staff, recently presented the plaque to General Robert E. Huyser, CINCMAC, lauding the command's record-setting year. In 1980, MAC suffered only four Class A flight mishaps, the lowest number of major accidents in one year in the command's history. All members of the MAC family can be proud of their part in preventing flight mishaps, saving lives and preserving precious national defense assets.

A GALAXY CREW SAVED NINE CREWMEN from a Royal Dutch Air Force coastal patrol aircraft. The 17-man crew from the 512 MAW (Assoc), Dover AFB, Del, was enroute to Europe when the Scottish ARTCC notified them the Dutch plane had ditched near their position. Picking up an ELT signal that gave them an approximate location, the C-5 flyers descended to 1,500 feet to search the Atlantic's surface. With low clouds, 50-knot winds churning up the cold ocean, and poor visibility, the search was difficult. After over an hour of looking for the Dutch plane, TSgt Edwin R. Sullivan spotted two flares. "They looked like two dots on top of a needle," he commented later. The crew radioed the survivor's position to a ship that was cooperating in the rescue attempt, and to the Center. After spending four hours in the icy North Atlantic, nine survivors from the plane's 12-man crew were recovered.

(Standing: Major Bok (AC), Maj Comstock, Capt Klingbeil, Maj Colwell, TSgt Wyman, MSgt Land, SMS Grose, A1C Bastone, MSgt Pennypacker. Kneeling: TSgt Davis, MSgt Sandor, TSgt Sullivan, TSgt Carnahan, A1C Byrom, AMN Davis. Not shown: SSgt Culver and SSgt Mauro.)

LIGHTNING STRUCK MAC AIRCRAFT 11 times during 1980. Damage cost for these electrifying encounters was over $50,000. Most of the strikes occurred during May through September--no suprise. A majority of them also happened in conditions known to signal a high probability of lightning--precipitation, turbulence and flying in clouds where the temperature was between +8° C and -8° C.

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Pretty realistic crewmember stress test, eh, Dr. Cranston?